

PATENT CLAIMS

1. A cooling-air cooler (10, 22, 28) for a gas-turbine plant (29) of a power plant (30, 44), in which
5 cooling-air cooler (10, 22, 28) first means (13, 14, 15) for spraying water into the cooling-air flow and second means (16, 17, 18, 23) for generating steam are arranged in a pressure vessel (11), through which the cooling air to be cooled flows, between a cooling-air
10 inlet (12) and a cooling-air outlet (20) in the cooling-air flow, characterized in that a water separator (19) is provided on the cooling-air side in the direction of flow downstream of the first means (13, 14, 15).

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2. The cooling-air cooler as claimed in claim 1, characterized in that the first means (13, 14, 15) are arranged directly downstream of the cooling-air inlet (12), in that the water separator (19) is arranged
20 directly upstream of the cooling-air outlet (20), and in that the second means (16, 17, 18, 23) are arranged between the first means (13, 14, 15) and the water separator (19).

25 3. The cooling-air cooler as claimed in either of claims 1 and 2, characterized in that the second means (16, 17, 18, 23) comprise a plurality of spiral tubes (17) through which water or steam flows and which extend in the form of spirals along an axis (53) lying
30 parallel to the cooling-air-side flow direction.

4. The cooling-air cooler as claimed in either of claims 1 and 2, characterized in that the second means (16, 17, 18, 23) comprise a plurality of finned tubes (23) through which water or steam flows and which are

arranged parallel to one another and extend parallel to the cooling-air-side flow direction.

5. The cooling-air cooler as claimed in either of
5 claims 1 and 2, characterized in that the second means
(16, 17, 18, 23) are subdivided into a first section
(16, 18, 23) for generating saturated steam and a
second section (16', 17, 18') for generating live
steam, and in that the two sections (16, 18, 23; 16',
10 17, 18') are connected one behind the other.

6. The cooling-air cooler as claimed in claim 5,
characterized in that one of the two sections comprises
15 a plurality of spiral tubes (17) through which water or
steam flows, and the other of the two sections
comprises a plurality of finned tubes (23) through
which water or steam flows.

7. The cooling-air cooler as claimed in one of claims
20 1 to 6, characterized in that the cooling air flows
perpendicularly through the pressure vessel (11) from
top to bottom in a single pass, and in that flow occurs
through the second means (16, 17, 18, 23) in
counterflow from bottom to top.

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8. The use of a cooling-air cooler as claimed in one
of claims 1 to 7 in the gas-turbine plant (29) of a
gas-turbine power plant (30).

30 9. The use as claimed in claim 8, characterized in
that the cooling of the cooling air in the cooling-air
cooler (10, 22, 28) is effected solely by spraying in
water by the first means (13, 14, 15).

35 10. The use as claimed in claim 8, characterized in
that the cooling of the cooling air in the cooling-air

cooler (10, 22, 28) is optionally effected by spraying in water by the first means (13, 14, 15) and/or by generating steam by the second means (16, 17, 18, 23), and in that, if need be, the generated steam is used
5 for injecting into the gas-turbine plant (29).

11. The use as claimed in claim 10, characterized in that the gas-turbine plant (29) comprises a compressor (33) and a turbine (35), in that the cooling of the
10 cooling air in the cooling-air cooler (10, 22, 28) is effected by generating steam by the second means (16, 17, 18, 23), and in that the generated steam is injected between compressor (33) and turbine (35).

15 12. The use as claimed in claim 10, characterized in that the cooling of the cooling air in the cooling-air cooler (10, 22, 28) is effected by generating steam by the second means (16, 17, 18, 23), and in that the generated steam is injected into the cooling air.

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13. The use of a cooling-air cooler as claimed in one of claims 1 to 7 in the gas-turbine plant (29) of a combined-cycle power plant (44).

25 14. The use as claimed in claim 13, characterized in that, if the water/steam circuit in the combined-cycle power plant (44) is omitted due to a failure of the water/steam circuit or in the course of a stage-by-stage development of the combined-cycle power plant
30 (44), the cooling of the cooling air in the cooling-air cooler (10, 22, 28) is effected solely by spraying in water by the first means (13, 14, 15).

15. The use as claimed in claim 13, characterized in
35 that, if the water/steam circuit in the combined-cycle

power plant (44) is omitted due to a failure of the water/steam circuit or in the course of a stage-by-stage development of the combined-cycle power plant (44), the cooling of the cooling air in the cooling-air 5 cooler (10, 22, 28) is optionally effected by spraying in water by the first means (13, 14, 15) and/or by generating steam by the second means (16, 17, 18, 23), and in that the generated steam is used for injecting into the gas-turbine plant (29).

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16. The use as claimed in claim 13, characterized in that the cooling of the cooling air in the cooling-air cooler (10, 22, 28) is effected solely by generating steam by the second means (16, 17, 18, 23), and in that 15 the generated steam is fed into the water/steam circuit of the combined-cycle power plant (44).